

Momentary decrease in cognitive performance as a vulnerability factor for substance use in schizophrenia

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Introduction. Fluctuations in executive performance as measured by smartphone-based cognitive tests have recently been shown to predict the manifestation of positive symptoms in patients with schizophrenia. The aim of this controlled study is to examine whether decreased cognitive performance on these same tests also increase the risk of substance use in this population.

Methods. Outpatients treated for schizophrenia (n=33) and healthy controls (n=45) completed an fMRI examination, followed by Ecological Momentary Assessment (EMA) for seven days. EMA assessed the experience of psychotic symptoms (patients only) as well as the use of psychoactive substances (all participants). At each EMA assessment, all participants also completed a mobile stroop or letter-word generation test.

Results. The association of poor performance on the letter-word generation test and substance use over subsequent hours of the day was significantly greater in patients with schizophrenia compared to controls (OR=1.16; 95% CI=1.08, 1.24). Within-group analyses confirmed that patients were far more likely to use substances following moments of reduced executive performance for both the mobile stroop (OR=43.88, 95% CI= 21.86, 88.08) and the letter-word test (OR=6.05, 95% CI=2.83, 12.95). Although positive symptoms at T0 were associated with increased anxiety at T1 ($\gamma = 0.57$, SE = 0.27, t = 2.11, p < 0.05), they did not directly predict substance use and therefore do not mediate the role of cognitive performance. Neuroimaging analyses demonstrated significant differences in connectivity underlying the EMA findings.

Conclusion. This investigation provides the very first evidence that within-day fluctuations in executive functions increase the risk of substance use in patients with schizophrenia, in addition to their association with positive symptoms. These findings strongly suggest that momentary executive dysfunction is a common underlying vulnerability factor for both psychotic symptoms and substance use.

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